

MISSOURI MONTHLY VITAL STATISTICS

Provisional Statistics

From The

MISSOURI DEPARTMENT OF HEALTH & SENIOR SERVICES
CENTER FOR HEALTH INFORMATION MANAGEMENT & EVALUATION
JEFFERSON CITY, MISSOURI 65102-0570
(573) 751-6272

June 2002 Vol. 36 No. 04

Focus...Motorcycle Helmets Reduce Head Injuries and Hospitalizations

Introduction

The Department of Health and Senior Services (DHSS) often receives requests for data showing that motorcycle helmets help to prevent head injuries. A good source of information on the effectiveness of motorcycle helmets is the DHSS CODES file. CODES is an acronym for Crash Outcome Data Evaluation System. This file is created by linking the Department of Public Safety's (DPS) motor vehicle crash records to the DHSS file of hospital emergency room and inpatient records. DPS maintains data on all crashes in Missouri that result in property damage of \$500 or more as well as those that cause injuries. An injured rider should have a crash record that is linked to their hospital record, whereas a rider who suffers only property damage will have no such linkage. This allows us to see whether motorcycle helmets and other factors are related to lower rates of head injuries and hospitalizations.

The purpose of this study, then, is to use the CODES data to examine the role of motorcycle helmets in preventing head injuries and reducing hospital charges.

Method

Thanks to Missouri's mandatory helmet-use law, a relatively small number of riders are unhelmeted, so relatively few are involved in crashes each year. It is difficult to do a thorough analysis when there are only a small number of events to work with, so the number of records was increased by using three years of CODES data, the 1993, 1996 and 1999 files. (The high cost of linking the crash and hospital files prevents us from developing a CODES data set every year.¹)

For these three years, 3305 crash records for motorcycle riders had information on helmet use.²

Altogether, we linked crash records for 2019 of the 3305 (61 percent) motorcyclists to their corresponding hospital or emergency room records. An additional 38 died at the scene or before reaching a hospital. The remaining 1248 unlinked records represent riders who suffered only property damage in their crashes, injured riders treated in a non-hospital setting, and a small number of riders whose records had problems that prevented them from being linked.

Results

Drivers of motorcycles accounted for 88 percent of the riders, passengers 12 percent. The motorcyclists were predominantly male (88 percent) and most were over the age of 20 (82 percent). Helmeted riders numbered 3098, or 94 percent of the 3,305 riders. Two-hundred- seven unhelmeted riders made up the remainder.

Unhelmeted riders were significantly³ more likely than helmeted riders to be severely injured: 7.7 percent of the unhelmeted riders died compared to 2.5 percent of the helmeted riders (Table 1). Close to thirty percent of the unhelmeted riders were admitted to the hospital compared to 19.5 percent of the helmeted riders (excludes non-hospital deaths from the comparison).

Head injuries were nearly three times as likely among unhelmeted riders. Nearly one in four, or 23.3 percent of unhelmeted motorcycle riders in crashes had a head injury treated in the emergency room or hospital. This compares to 8.3 percent of the helmeted riders, a statistically significant difference. Head-injured riders made up a disproportionate share of the deaths. Of the 55 deaths in the emergency room or hospital, 31 (56 percent) were to the head-injured. Though making up

(continued on next page)

only 6 percent of the riders in crashes, the unhelmeted riders accounted for 26 percent of these deaths (8/31).

Injured motorcyclists incurred substantial hospital charges during the three years of the study. For the 2019 riders seen either in the emergency room or admitted to a hospital, charges totaled over 17.8 million dollars or nearly \$6 million per year. And this does not account for inflation or for those who had to be excluded from the study. Of the \$17.8 million, 61 percent was covered by commercial insurance, which is usually paid by employers. This left \$6.9 million to be covered by government sources and individuals with no insurance. These costs would have been covered by tax dollars or contributed to higher insurance premiums for the rest of us. Among the unhelmeted riders with known insurance status, 55 percent were reported as being uninsured. This is more than three times the 17 percent rate among the helmeted riders, a significant difference.

The average charges for three years for just the inpatient stays were \$24,767 for 598 helmeted riders and \$19,581 for 60 unhelmeted riders. However, comparing just the hospital charges for injured riders ignores the many hospitalizations that are avoided by the use of helmets. A better method is to compute the total inpatient charges that the helmeted group would have had if their hospitalization rate had been the same as the unhelmeted group, and then compare this to their actual charges. Of the total 207 unhelmeted

motorcyclists, 60 (or 29 percent) were hospitalized. Applying this same percentage to the 3098 helmeted riders yields a total of 898 hospitalized riders, or 300 above the actual 598 hospitalized helmeted riders. Multiplying 898 by the average hospitalization rate of \$19,581 for unhelmeted riders results in an estimated total charge of \$17,583,738. Thus helmet use results in an estimated savings of \$2,773,072 over the actual total inpatient charges of \$14,810,666 for the helmeted riders.

Discussion and Conclusion

The method used above assumes that all the other factors that affect hospitalizations are similar for helmeted and unhelmeted riders. At least in Missouri, this assumption is unwarranted. Probably in part because of our helmet law, helmeted and unhelmeted crash victims appear to come from different populations and have different kinds of crashes. The data suggest that unhelmeted riders are younger people more likely to live in rural areas and to engage in risky behaviors. For example, a higher percentage of the unhelmeted riders were under the age of 21 (35 percent vs. 16 percent), uninsured (55 percent vs. 17 percent), involved in speed-related crashes (38 percent vs. 25 percent) and head-on crashes (7 percent vs. 3 percent). Unhelmeted riders were more likely to have their crashes on county roads (23 percent vs. 10 percent) and less likely to have them on interstate, U.S highways or numbered state highways (15 percent vs. 41 percent). None of the unhelmeted riders crashed in speed zones over 60 mph,

Table 1
Comparison of Crash Outcomes for Helmeted and Unhelmeted Motorcyclists

<u>Outcome</u>	<u>Helmeted</u>		<u>Unhelmeted</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Hospitalized	598	19.5	60	29.0
Head Injured	254	8.3	47	23.4
Died	77	2.5	16	7.7

Note: Percents for the hospitalized and head-injured are based on denominators of 3066 helmeted and 201 unhelmeted riders. (They exclude the non-hospital deaths.) The percents for the deaths are based on the entire 3098 helmeted and 207 unhelmeted riders

Source: 1993, 1996 and 1999 CODES files.

but they had a higher rate of crashes in 55-60 mph speed zones (46 percent vs. 35 percent). Among just the drivers of motorcycles, the unhelmeted had higher reported rates of driving while intoxicated (18 percent vs. 7 percent) and lower rates of being motorcycle qualified (31 percent vs. 72 percent). (All significant at $p < .05$.)

Other studies have attempted to take such differences into account using more sophisticated methods of adjustment.^{4,5} They have also concluded that motorcycle helmets reduce head injuries and hospital costs. One study that used CODES data from Missouri and six other states was done by the National Highway Traffic Safety Administration.⁶ Using logistic regression to rule out the influence of the kinds of factors noted above, they found that for the combined seven states, the average inpatient charge for unhelmeted riders was 36 percent higher than for helmeted riders.

In conclusion, analysis of the CODES data show that motorcycle helmets are effective in reducing head injuries and hospitalizations.

Statistical Note

During each of the last few years bills have been introduced into the legislature to require motorcycle helmet use only by riders under the age of 21. This typically spawns requests for information from the head and spinal cord injury registry maintained by the Department of Health and Senior Services (DHSS). Users often expect these data to show that helmeted riders have lower rates of head injuries and hospital charges than unhelmeted riders.

Unfortunately, the registry is not the best source of this information. It contains records only of motorcyclists who are injured severely enough to be hospitalized. These data are not well-suited to shed light on the role of helmets in reducing head injuries and hospitalizations. For example, registry data for the five years from 1995-1999 show that in two of those years unhelmeted riders had lower average inpatient charges than helmeted riders; in one year the charges were about the same, and in the remaining two years the unhelmeted riders had higher average charges. As this FOCUS article indicates, CODES data, which provide information on both the hospitalized and non-hospitalized cyclists, are better suited to show the role of motorcycle helmets in preventing head injuries and hospitalizations.

Footnotes and References:

1. The DHSS CODES data sets were funded through grants from the National Highway Traffic Safety Administration and from the Division of Highway Safety, Missouri Department of Public Safety.

2. 1003 records lacked information on helmet use and could not be used in the study. Additionally, slightly less than 150 motorcycle crash records were excluded because they did not contain enough information to allow linkage or analysis.

3. All statistical tests were Chi-square tests for independence and were reported to be significant if they met the .05 criterion.

4. Hartunian NS, Smart CN, Willemain TR, Zador PL. The Economics of Safety Deregulation: Lives and Dollars Lost due to Repeal of Motorcycle Helmet Laws. Journal of Health Politics, Policy and Law, 1983; 8(1): 76-98.

5. Muller A. Evaluation of the Costs and Benefits of Motorcycle Helmet Laws. American Journal of Public Health, 1980; 70: 586-592.

6. Benefits of Safety Belts and Motorcycle Helmets. Report to Congress, February 1996. DOT, NHTSA, February, 1996.

Provisional Vital Statistics for April 2002

Live births increased in April as 6,611 Missouri babies were born compared with 6,246 one year earlier. Cumulative births for the 4- and 12-month periods ending with April both show decreases. For the first third of the year, births decreased by 6.9 percent from 25,862 to 24,085.

Deaths increased in April as 6,070 Missourians died compared with 3,932 in April 2001. Cumulative deaths for the 4- and 12-month periods ending with April also both show increases.

The **Natural increase** in April was 541 (6,611 births minus 6,070 deaths), down from 2,314 one

year earlier. The natural increase was also down for the 4- and 12-month periods ending with April.

Marriages and **Dissolutions of marriage** both decreased for all three time periods shown below. The marriage to divorce ratio increased from 1.74 to 1.82 for the 12 months ending with April.

Infant deaths increased in April as 70 Missouri infants died compared with 45 one year earlier. For the 12 months ending with April, the infant death rate increased from 7.3 to 8.2 per 1,000 live births.

PROVISIONAL VITAL STATISTICS FOR APRIL 2002

Item	<u>April</u>				<u>Jan.-Apr. cumulative</u>				<u>12 months ending with April</u>				
	<u>Number</u>		<u>Rate*</u>		<u>Number</u>		<u>Rate*</u>		<u>Number</u>		<u>Rate*</u>		
	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
Live Births	6,246	6,611	12.7	14.2	25,862	24,085	14.0	12.9	78,217	73,752	13.6	13.9	13.1
Deaths	3,932	6,070	8.0	13.0	19,877	21,062	10.7	11.3	54,116	55,512	9.9	9.7	9.8
Natural increase	2,314	541	4.7	1.2	5,985	3,023	3.2	1.6	24,101	18,240	3.7	4.3	3.2
Marriages	3,149	3,021	6.4	6.5	10,228	9,955	5.5	5.3	42,995	41,813	8.1	7.7	7.4
Dissolutions	2,108	1,800	4.3	3.9	7,872	7,344	4.3	3.9	24,648	23,030	4.5	4.4	4.1
Infant deaths	45	70	7.2	10.6	225	225	8.7	9.3	572	604	7.8	7.3	8.2
Population base (in thousands)	...	...	5,630	5,665	...	...	5,630	5,665	...	...	5,563	5,607	5,642

* Rates for live births, deaths, natural increase, marriages and dissolutions are computed on the number per 1000 estimated population. The infant death rate is based on the number of infant deaths per 1000 live births. Rates are adjusted to account for varying lengths of monthly reporting periods.

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER - Services provided on a nondiscriminatory basis.

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health & Senior Services, Center for Health Information Management & Evaluation/Section for Health Statistics, P.O. Box 570, Jefferson City, MO 65102; phone (573) 751-6278. Hearing-impaired citizens telephone 1-800-735-2966.